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ABSTRACT

A researcher examined the numbers of relative clauses and the percentages of subordinate clauses that relative clauses comprise in two sets of research reports (one set from the period 1893-1901 and the other from 1980) about spectroscopy from the "Physical Review." He analyzed some striking differences between the sets in patterns of what the relative clauses modify and also uncovered some evidence pointing to a general stylistic shift from the first set to the second. The shift of interest is between what M.A.K. Halliday calls the dynamic style and what he calls the synoptic style. When Halliday examines different linguistic styles or modes of representing experience, he uses a continuum. At one pole of this continuum is a style he calls dynamic, often associated with spontaneous and unselfconscious speech; at the other end of Halliday's continuum is the synoptic style, often associated with carefully planned, formal writing. The suspicion that a stylistic shift from dynamic to synoptic could have occurred from the first set of reports to the second arose when it was noticed that the first set contained numerous sentences displaying great causal intricacy, while the second set contained numerous sentences displaying great lexical density. An examination of various stylistic traits showed differences which point to a more clausally intricate style in the early articles and a more lexically dense style in the later articles. In light of the potential advantages of the synoptic style for specialists within a research area, it appears that a shift to this style in the history of writing about spectroscopy could have been highly motivated. If teachers and scholars reach a consensus about whether or not to teach the synoptic style, they might also discuss what the best way for doing so might be. (Contains 21 references.) (NKA)

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Dynamic and Synoptic Styles, Kinds of Semiotic Practices, and Learning to Write in the Disciplines.

by William J. Vande Kopple

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Dynamic and Synoptic Styles, Kinds of Semiotic Practices,

and Learning to Write in the Disciplines

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In preparing "Relative Clauses in Spectroscopic Articles in the *Physical Review*, Beginnings and 1980: Some Changes in Patterns of Modification and A Connection to a Possible Shift in Style" (*Written Communication*, 1998, *15*, 170-202), I examined the numbers of relative clauses and the percentages of subordinate clauses that relative clauses comprise in two sets of research reports about spectroscopy from the *Physical Review*. The first set consists of five articles from the earliest years of this journal's life (1893-1901) and contains 20,259 words. The second set consists of eight articles from 1980 and contains 20,212 words. The titles of the articles in these two sets appear in the References and are marked with an asterisk.

As I examined the relative clauses in these sets of articles, and as I analyzed some striking differences between the sets in patterns of what the relative clauses modify, I also uncovered some evidence pointing to a general stylistic shift from the first set to the second. As I was preparing "Relative Clauses," however, I did not have enough time to pursue in detail the evidence related to a possible stylistic shift. Toward the end of "Relative Clauses," therefore, I was able only to suggest that a stylistic shift might have occurred and to speculate about some

CS 217 108

possible implications of such a shift. It is this possible stylistic shift that I would now like to report on in greater detail.

The shift of interest is between what M.A.K. Halliday calls the dynamic style and what he calls the synoptic style. When Halliday examines different linguistic styles or modes of representing experience, he works with a continuum. At one pole of this continuum is a style that he calls dynamic, which is often associated with spontaneous and unselfconscious speech. The chief characteristic of the dynamic style is grammatical or clausal intricacy. Sentences in this style typically contain many clauses, some hypotactically and some paratactically related to others. In Halliday's terms, hypotaxis is "the relation between a dependent element and its dominant . . . ," and parataxis "is the relation between two like elements of equal status . . ." (1994, p. 218). Sentences in the dynamic style can include so many clauses that sometimes the people who utter them, on hearing them replayed, refuse to acknowledge that they did say them or even could have said them.

Here is an example that Halliday gives of a sentence in the dynamic style; this sentence was recorded in the conversation of a dog-breeder:

> I had to wait, I had to wait till it was born and till it got to about eight or ten weeks of age, then I bought my first dachshund, a black-and-tan bitch puppy, as they told me I should have bought a bitch puppy to start off with, because if she wasn't a hundred percent good I could choose a top champion dog to mate her to, and then produce something that was good, which would be in my own kennel prefix. (cited in Halliday, 1987b, p. 59)

At the other end of Halliday's continuum is the synoptic style. This style, which is often associated with carefully planned, formal writing, has as its chief characteristic lexical density, which is "the proportion of lexical words [content words] to the total discourse" (Halliday,

1987b, p. 60). Lexical density can be measured in several ways; I will proceed as Halliday frequently does--by relating the number of nouns, verbs, bases of infinitives, adverbs, and adjectives to the number of unembedded clauses.

Here is an example of a sentence with a high degree of lexical density. This sentence, which comes from a medical journal, appears here with its lexical words underlined:

> In conclusion, the administration of dexamethasone significantly reduced concentrations of protein and lactate and increased glucose concentrations in the cerebrospinal fluid approximately 24 hours after the beginning of treatment, and significantly reduced the incidence of moderate to profound bilateral sensorineural hearing impairment. (Lebel et al., 1988, p. 971)

This sentence is made up of one independent clause and contains twenty-seven lexical words (counting 24 as one lexical word); it, therefore, has a lexical density of 27 (lexical words) to 1 (unembedded clause).

I first began to suspect that a shift from the dynamic to the synoptic style could have occurred from the first set of research reports to the second when I noticed numerous sentences displaying great clausal intricacy in the first set and numerous sentences displaying great lexical density in the second set.

Here is an example of a sentence with a high degree of clausal intricacy from Merritt (1895, p. 429); in this sentence there are two independent clauses, a noun clause, an adverb clause, and two adjective clauses:

> The fact that the field of the spectrometer was never entirely dark, even when the telescope was placed far beyond the region of the visible spectrum, seemed to support this explanation of the difficulty, for any cause which would produce an irregular scattering of the visible rays would probably bring about the same effect

in the case of those that are invisible.

As I noted, I also found that many sentences in the articles from 1980 display a high degree of lexical density. Here is an example from Lam, Gupta, and Happer (1980, p. 1231); in this example the lexical words are underlined: "Slight shifts in the positions of the peaks in Fig. 5 for two different polarizations are due to changes in the relative magnitudes of the overlapping resonances within each group." This sentence has eighteen lexical words to one clause.

As I moved from general impressions about the styles in the two sets of articles to calculations about their stylistic traits, I found impressive evidence that a shift in style had indeed taken place. I calculated the ratio of the total number of clauses to orthographic sentences for both sets of articles. In the early set, there are 1,500 clauses and 825 orthographic sentences; in this set, therefore, there are 1.82 clauses per orthographic sentence. In the later set, there are 1,402 clauses and 916 orthographic sentences; in this set there are only 1.53 clauses per orthographic sentence. Therefore, the orthographic sentences in the early set of articles average nearly one-third (1.82 - 1.53 = .29) of a clause more than do those in the later set. Running a two-sample t-test on these data produced a t of 3.0974 ($p = .008$).

I also examined how many lexical words per clause there are in both sets. In the early articles I found 11,188 lexical words and 1,500 total clauses (7.46 lexical words per clause). In the later set of articles I found 12,291 lexical words and 1,402 total clauses (8.77 lexical words per clause). Running a two-sample t-test on these data produced a t of –3.37 ($p = .003$).

These calculations, therefore, revealed statistically significant differences between the two sets in total clauses per sentence and lexical words per clause. And these differences point to a much more clausally intricate style in the early articles and a much more lexically dense style in the later articles. This does not mean that no lexically dense sentences appear in the early set of articles. Nor does it mean that no clausally intricate sentences appear in the later set

of articles. It does mean that with respect to general characteristics of the writing in the *Physical Review* about spectroscopy, the twentieth century appears to have witnessed a shift from the dynamic to the synoptic style.

Why might this have occurred?

Consider first why the dynamic style might have been especially useful to the early writers about spectroscopy. One of their chief concerns centered on their research methodology. That is, they were often taking initial or very early steps in a line of research, and one of their main concerns was to lay out the nature and sequence of those steps for other researchers. Thus, the dynamic style, with its capability to represent the sequences of many dimensions of actions, would have been remarkably well suited for the task at hand.

However, for tasks that the later writers about spectroscopy faced, a shift to the synoptic style would have offered at least two advantages. In the first place, as Wells (1960) shows, in using the synoptic style, writers do not have to give indications about tense. *At the point of the ray's disappearance* does not indicate precisely when the ray disappeared, disappears, or will disappear. Such constructions can be useful when writers want to do what the physicists writing in 1980 often did: refer to recurring conditions or tabulate results that are meant to be viewed as widely generalizable over place and time.

In the second place, the synoptic mode allows those who are working within extensive networks of information that have been built up over time to communicate with one another efficiently. As Halliday (1987a) points out, "When I can say 'the random fluctuations in the spin components of one of the two particles,' I am packaging the knowledge that has developed over a long series of preceding arguments" (p. 149). And writers can refer to this knowledge very economically; perhaps the most noticeable characteristic of the synoptic style is the great amount of information it can express in a little space. Scientists do not have to say every time "that

particles spin, that they spin in three dimensions, that a pair of particles can spin in association with one another, that each one of the pair fluctuates randomly as it spins, and so on" (Halliday, 1987a, p. 149).

People who can work and write with advantages such as these can make progress in a specific field. They can store up knowledge in texts about work that has already been done, they can refer economically to this work, they can get ideas about the next step or steps in that line of work, and they can move on to the new work. As Halliday (1987a) points out, with such advantages any given worker and discourse can start where others have left off (p. 149).

As I have shown elsewhere (Vande Kopple, 1992), such advantages do not come without costs and responsibilities. One potential cost centers on potential ambiguities. The long and complex noun phrases associated with the synoptic style, many of which have nominalizations as heads, leave many semantic relationships unexpressed. Readers who have not followed the trail of discourse in a particular research area are unlikely to be able to fill in these meanings correctly on their own. Thus, the synoptic style raises questions about accessibility to certain kinds of information within a society.

However, in the light of the potential advantages of the synoptic style for specialists within a research area, it appears that a shift to this style in the history of writing about spectroscopy could have been highly motivated. As Bazerman shows, once many confusing theoretical issues in spectroscopy had been clarified in the late 1920s, writers began to rely more and more on "background and contextual knowledge" and to embed their arguments more and more "in the web of literature in the field" (p. 172). Thus it is sensible to suppose that a style that would allow writers to refer to background and contextual information economically would have been most attractive to them consciously or unconsciously.

At this point, two questions about the synoptic style suggest themselves. In the first place, should teachers of scientific writing make this style the subject of their instruction? Some people that I have talked to say that if the synoptic style is the style that research scientists working within specialized research areas use to write to one another, and that if students wish to join such a community of scientists, then it is the responsibility of the teacher of scientific writing to help those students acquire this style as fully and quickly as possible.

Other people say that this style locks too many people out, that it is comprehensible to only a few. Such a situation, they say, is dangerous. They therefore recommend that teachers of scientific writing encourage their students to buck the stylistic trends of the scientific fields they seek to enter, all in hopes of effecting changes to a more verbal or clausal style. Since their opponents see this strategy as actually disempowering students, debates about this matter can become quite heated. I hope that more teachers and scholars will make contributions to this debate in the future.

I also hope that if teachers and scholars reach a consensus about whether or not to teach the synoptic style, they will also discuss what the best way for doing so might be. Some teachers of scientific writing that I have talked to argue that the synoptic style can be taught by defining and displaying its specific traits to students and having them practice using them in their own prose. Others have argued that the synoptic style can not be fully learned in the abstract. They argue that aspects of this style must be learned in an apprenticeship, in which students actually explore the background to various scientific questions and participate in the planning and carrying out of experiments focusing on those questions. More research on this issue in the future is needed.

Before closing, I would like to draw your attention to one more issue: At one point, Halliday (1987b) notes that between the dynamic and synoptic poles of his continuum of styles

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"are many mixed and intermediate types" (p. 59). Perhaps further work on and discussion of the styles evident in spectroscopic articles could lead to the identification of particular "mixed and intermediate types" and specify the linguistic traits associated with them. If so, it would be interesting to explore in greater depth the whole nature of possible congruence between linguistic complexity and our real-world experience. The synoptic and dynamic styles seem to be congruent with reflection and representation of events in sequence, respectively. Is it possible that other identifiable styles are congruent with other aspects of our experience or our ways of categorizing that experience? Beyond such issues, it would also be interesting to ask in what kinds of writing the various types of style identified have been used, to what ends they have been put, and whether any changes in the patterns of their use are becoming evident as patterns of information storage and dissemination change.

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